

- 15 -

## **CLAIMS**

1. A biochip assembly (1) comprising:
  - 5 a plurality of enclosed elongate microchannels, each microchannel having an inlet port adjacent one of its proximal and distal ends; and an outlet port adjacent its other end;
  - a plurality of reservoir wells for use with the microchannels;
  - 10 an enclosed liquid delivery channel assembly having two or more combined inlet and outlet ports, at least one forming an inlet port and at least one other forming an outlet port; and
  - 15 an enclosed sample holder transfer assembly for connecting a port of one part of the biochip assembly to a port or reservoir well of another part and for connecting two reservoir wells together, characterised in that the biochip assembly (1) comprises:
    - 20 a main support frame (11);
    - a plurality of separate and removable biochip modules (15, 16, 17), namely an input module (15) forming the enclosed liquid delivery assembly, at least one reservoir well containing a module (16) and a
    - 25 microchannel containing module (17) and in which the enclosed sample holder transfer assembly (18) comprises a pair of support plates (20); a plurality of rigid tubes (22) mounted on each support plate (20) for engagement with the modules (15, 16, 16) and with transfer conduits (23) for connecting a rigid tube (22) on one support plate (20) with a
    - 30 rigid tube (22) on the other support plate (20).
2. A biochip assembly (1) as claimed in claim 1, in which the transfer conduits (23) are of a flexible material.

- 16 -

3. A biochip assembly (1) as claimed in claim 1 or 2, in which there are two reservoir containing modules (16(a) and 16(b)).
4. A biochip assembly (1) as claimed in claim 3, in which a reservoir containing module (16(a) and 16(b)) is arranged on either side of the microchannel containing module (17) with the input module (15) adjacent one of the reservoir containing modules (16).
5. A biochip assembly (1) as claimed in any preceding claim, in which releasable connection means (42) are provided on the main support frame (11) for securing each of the support plates (20) in spaced-apart relationship with each of the input module (15) and the microchannel containing module (17) and with each rigid tube (22) connecting in liquid sealing manner with the appropriate port (32, 35, 36).
6. A biochip assembly (1) as claimed in claim 5, in which each port (32, 35, 36) comprises a compressible seal (50) for engagement with a rigid tube (22).
7. A biochip assembly (1) as claimed in claim 6, in which the releasable connection means (42) is adapted to engage the rigid tube (22) with the compressible seal (50) to form a liquid seal.
8. A biochip assembly (1) as claimed in any preceding claim, in which the cross-sectional area of the microchannel (37) varies along its length.
9. A biochip assembly (1) as claimed in any preceding claim, in which the microchannel containing module (15) comprises:
  - sheets of flat plastics material laminated together to form an upper layer having through holes (63) for forming input ports (35) and output ports (36):
  - an intermediate layer (61) having cut-out through slots (64) forming microchannels (37); and

- 17 -

a base layer (62).

10. A biochip assembly (1) as claimed in claim 9, in which the intermediate layer  
5 (61) is of a photo-resist fluoro-polymer material, secured to the other layers  
(60 and 62) by ultraviolet (UV) curing.
11. A biochip assembly (1) as claimed in claim 9, in which the intermediate layer  
10 (61) is of a photo-resist fluoro-polymer material secured to the top layer (60)  
by ultraviolet (UV) curing and the bottom layer (62) is a peel-off sheet (65) of  
polyester film, secured to the intermediate layer (61) by an adhesive.